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ABSTRACT

Following a summary of what is presently known about transfer skills, the options available for assessment of transfer skills are identified and problems inherent in that task examined. Transfer skills (the ability or capacity of the learner or worker to transfer skills or knowledge from prior experiences to new ones) are discussed using the work of a number of contemporary theorists and noting points of general agreement. Types of educational measurements that can be applied to the assessment of transfer of skills are classified as either traditional or nontraditional methods. Traditional methods examined are paper and pencil, multiple choice, and objective tests. Nontraditional methods analyzed are interviews and oral examinations; simulations; essays; performance tests; and self-assessment devices. Examples of each, their use as well as advantages and disadvantages, are given. It is noted that no specific tests or procedures could be recommended as end-alls; rather, they are presented as tools to help determine if transfer has occurred. A bibliography of selected documents describing nontraditional assessment methods is included as an appendix. (MEK)

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ASSESSING TRANSFER SKILLS

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FOREWORD

Recent surveys indicate that job change, either by choice or by necessity, has become a fact of life for a substantial proportion of the adult population. In order to better serve their students and employees, education and work programs need a thorough understanding of the factors which improve the ability of individuals to adapt to such change. In an effort to provide this understanding, the National Center for Research in Vocational Education, under the sponsorship of the National Institute of Education, has been involved in the delineation of the factors which make an individual occupationally adaptable.

One of the concepts connected with occupational adaptability is that of transfer skills. These are skills which enable an individual to take competencies, attitudes, and knowledge gained in a work or school setting and to apply them to tasks confronted in a new work environment. Since individuals may not be able to recognize their own transfer skills, methods for the assessment of these skills are vitally important. This report reviews the options available for the assessment of transfer skills and identifies the problems inherent in this difficult task.

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Robert E. Taylor
Executive Director
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PREFACE

When I was approached with the task of writing a paper on assessment for the National Center for Research in Vocational Education, I accepted enthusiastically for several reasons: (1) The study of measurement and assessment of prior learning from experience has taken up a significant portion of my professional work. Thus, I thought it would give me an opportunity to apply various assessment concepts to an aspect of learning that was new to me—transfer skills; (2) I hoped I could produce a useful handbook for practitioners to use in educational assessment situations; (3) Finally, because of past work in assessment, I smugly thought it would be a relatively simple assignment, which added even more to my enthusiasm.

In practice, the task turned out to be, in its early stages, a puzzlement, and in its later stages a challenge. At the end, I realized that my goals for a handbook were premature and somewhat ambitious. I learned that the term "transfer skills" was not well defined in educational psychology and measurement. Semantic confusions in the social sciences are not unusual. But the aura of uncertainty about "transfer skills" was confirmed when I searched various literature data bases and found few references under "transfer skills," whereas, for example, the term "intelligence" gave me more than I cared to examine.

Further investigations convinced me that there was a significant body of research in "transfer of training" which peaked in the early sixties. I feel that this research is soon to be revived. Researchers and educators *do* believe that transfer ability or the capacity for transfer can be defined and is a construct subject to research and, more importantly, is teachable. I feel the new work will veer away from the methodology of the past that focused on highly controlled experimentation using nonsense syllables and simple motor tasks to studies that are more naturalistic and involve the training and eliciting of complex transfer competencies.

This paper represents an attempt to tell briefly what is known about transfer and to generally touch upon the usefulness of various assessment procedures to the transfer process.

ASSESSING TRANSFER SKILLS

What are Transfer Skills?

The terms *transfer skills* or *transfer abilities* will be used frequently throughout this paper. From the outset, a distinction needs to be made between transfer skills and transferable skills. *Transferable skills* are those abilities and competencies that can be applied in a variety of work settings as well as in almost every aspect of life. Although there are a number of taxonomies that list and describe functional skills necessary for occupational and life adaptability, there is no widespread agreement on one particular core set of transferable skills.[1] Nevertheless, through basic research in learning psychology it is known that some skills are more transferable than others and that the ease and effectiveness of transfer depends on a number of factors.

One of the major factors that influences the transfer of skills and training is the extent and level of *transfer skills* possessed by an individual. What is the ability or capacity of the learner or worker to transfer one or several skills from one setting to another? For example, a worker has the ability to estimate time, weight, and distance on an assembly line (transferable skills). Can these skills be transferred to a sales job where these or comparable skills are needed to estimate the costs of a product for a potential customer or buyer? Can these skills be transferred to a hobby like furniture-building? What are the skills or abilities that lead to transfer?

Although much research has been conducted about transfer of learning, a precise list of the cognitive factors that aid skill transfer does not exist. However, it is thought by some psychologists that cognitive abilities or factors such as the following could be the catalysts without which the process of transfer could not occur.

1. *Cue recognition:* ability to identify and recognize significant signals, signs, and inputs through the senses and relate them to relevant factors and/or situational variables.
2. *Discrimination:* ability to discern significant differences in object, events, and ideas and sort or group according to difference.
3. *Association:* ability to recognize significant similarities between objects, events, and ideas and to order, organize, or group according to similarity.
4. *Reasoning by analogy:* ability to develop and apply a rational line of reasoning drawing upon comparisons of analogous situations, events, and characteristics.
5. *Rule or theory application:* ability to interpret and apply a rule, strategy guideline, or theory in varying contexts and circumstances.

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[1] See the following for two different sets of transferable skills:

Wiant, A. A. *Transferable Skills: The employer's viewpoint.* Columbus, OH: The Ohio State University, The National Center for Research in Vocational Education, 1977. (Info. Series No. 126)

Kawula, H. J., and Smith, A. D. *Generic skills: Handbook of occupational information.* Prince Albert, SK: Canada Manpower and Immigration Department, Training Research and Development Station, 1975.

6. *Information access:* skill in finding and interpreting information from a variety of extant sources.

7. *Information production:* skill in producing and recording information in a variety of formats and styles for the purpose of transfer and storage.

8. *Synthesis:* ability to compile and condense information, data, or concepts into concise statements, findings, or propositions that express new or different relationships.

9. *Decision making:* ability to establish a rational criterion for selection and apply it to two or more alternative courses of action to choose one.

10. *Solution generation:* ability to generate a variety of alternative solutions or probable solutions for a given problem.

11. *Short-term planning:* ability to organize a series of immediate events, tasks, or activities into a sequence and resources to accomplish a single goal in a short time frame (hours/days).

12. *Long-term planning:* ability to organize a series of broad functions, processes, and/or activities and resources in order to accomplish one or more goals over a long time frame (weeks/months).

13. *Value analysis:* ability to rationally compare/contrast alternative payoffs or outcomes and determine probable utility of each one in comparison to all others.

Another way of looking at transfer skills and abilities does not compartmentalize them into a long list of discrete cognitive factors but looks at them in terms of patterns of behavior that are likely to lead to successful or unsuccessful transfer. The contexts in which these mental operations are likely to succeed are equally important. One model that has been proposed states that there are *generic skills* that are basically a small set of mental operations and appear again and again as components of *successful learning behavior.*[2] Further, using a biological analogy, these are not available for direct inspection (genotypic); we only know these skills when they are actually employed (phenotypic), and lead to successful learning transfer. Those behaviors sufficient for smooth conceptual transfer might be:

1. *Selective attention:* ability to control the class of stimuli which receive conscious focus.

2. *Sustained analysis:* a capacity to probe a complex situation until all its components are identified.

3. *Analogizing:* a capacity to test known relationships for similarity with those potential to a new situation.

4. *Suspension of closure:* prioritizing (synthesizing) factors before shaping solution.

5. *Autocensorship:* testing a solution covertly, before affirmation.

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[2] Woditsch, G. A. *Developing generic skills: A model for competency-based general education.* Bowling Green, OH: Bowling Green State University, CUE Project, 1977 (Occasional Paper Series No. 3).

Conversely, research shows forms of behavior that accompany learning failure are also readily observed:

1. Learner exhibits random attention.
2. Learner scans compulsively and haphazardly.
3. Learner fails to test prior knowledge against potential relationships in a problem.
4. Learner guesses chronically.
5. Learner fails to check solution to problem.

The Woditsch model also is in agreement with the large body of transfer of training research that attempts to investigate the conceptual and motivational as well as cognitive factors that strongly influence the transfer of skills.[3]

A great deal of this research focuses on fairly trivial and narrow (not generic) skills because it was thought that controlled experiments would lead to a clearer understanding of the phenomenon. Much was learned from these investigations. The major finding was that the transfer process was extraordinarily complex. This realization led to a variety of theories that attempt to explain what happens when learning is transferred.[4] No matter what theory is espoused there is some agreement about the following:

1. All skills are potentially transferable.
2. Skills must be developed to high levels of mastery if positive transfer is to occur.
3. Heightened transfer occurs when the content, context, and process of learning are similar from one situation to another. When any of these vary, transfer is diminished.
4. Those cognitive operations that aid in transfer are closely related to the psychological constructs labeled "intelligence" or "problem-solving ability."
5. Relaying performance information (feedback) to the learner maximizes skill transfer. The more similar the feedback from one situation to the other, the greater the potential for transfer.
6. Once a skill is transferred or a problem is solved there is confidence it can be done again.
7. Transfer is accomplished more easily if the learner can discover the relationships between the skill(s) and situation(s) for him or herself.
8. Transfer skills are perishable. The transfer facility and its retention depends on practice, attitude, and the biological age of the learner.
9. Transfer is aided by making the goals of training explicit and exposing the learner to the variety of situations in which he or she may exercise skills.

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[3] For summaries of this research see:

Altman, J. W. *Transferability of vocational skills: Review of literature and research.* Columbus, OH: The Ohio State University, The National Center for Research in Vocational Education, 1976. Info. Series No. 103.

Stolurow, L. M. *Psychological and educational factors in transfer of training. Section 1 Final Report.* Urbana, IL: University of Illinois, Bureau of Educational Research, July 1966.

[4] Royer, J. M. Theories of transfer of learning. *Educational Psychologist,* 1979, *14,* 53-69.

10. The extent to which a skill can be transferred depends on:
    a. type of skill and the conditions of practice;
    b. anxiety level of the learner;
    c. sex and minority status of the learner;
    d. reward system

11. The facility for transfer can be taught, yet our educational system frequently does not teach these skills. Many programs not only do not teach for transfer, but existing teaching and assessment methods often retard transfer.

Another way of describing the process of transfer is to say that transfer ability is really a complex master competence that results from highly integrated cognitive factors. This competence is really what many call problem-solving ability, adaptability, flexibility (as opposed to rigidity), or insight, which is the rapid solution of problems resulting from extensive practice.

Clearly, much of the teaching and testing during the education of a typical individual occurs in an academic, nonrealistic setting. Knowledge acquisition is emphasized over application and analysis. If problem-solving is emphasized, it is assumed that there is one solution to the problem and one route to get that solution. Unfortunately, skill transfer on the job and in life is quite different. A clear example of the limits of schooling is contained in a story about the Kpelle, an articulate, unschooled people of Liberia. The Kpelle do poorly on tests and problems that seem easy to their schooled counterparts.

Tester: Flumo and Yakpalo always drink canejuice (rum) together. Flumo is drinking cane juice. Is Yakpalo drinking cane juice?

Subject: Flumo and Yakpalo drink cane juice together, but this time Flumo was drinking the first one. Yakpalo was not there on that day.

Tester: But I told you that Flumo and Yakpalo always drink cane juice together. One day Flumo was drinking cane juice. Was Yakpalo drinking cane juice that day?

Subject: The day Flumo was drinking the cane juice Yakpalo was not there on that day.

Tester: What is the reason?

Subject: The reason is that Yakpalo went to his farm on that day and Flumo remained in town that day.[5]

The tester reported that his subjects often responded by saying something like "Yakpalo isn't here at the moment, why don't you go and ask him about the matter?"

These exchanges show that the Kpelle are a clever people. The problem here is that the subjects do not accept the ground rule that is automatic with academic people: Base your answer on the terms defined by the teacher (or tester).

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[5] Cole, M., and Scribner, S. *Culture and thought.* New York: Wiley, 1974.

> In school, a problem should be tackled in the same way no matter which teacher assigns it to you (teachers keep changing); numerical problems are worked out similarly regardless of whether apples or bombs are to be added (or without any specific numbers at all, as in algebra); geography is to be mastered whether or not one has any interest in traveling. The school child learns to use one particular skill or heuristic to solve many different puzzles, even if they differ in any details, simply because they share an abstract structure. He also learns to work on problems as they are presented, whether he cares about the solutions or not. It is the absence of these attitudes among the unschooled Kpelle that accounts in large part for the sorts of answers they give to questions.
>
> School shapes our thinking in other ways.
>
> We are expected to leave our life situations at the door, as it were, and to solve problems that other people have set. Notice also that problems on school tests are supposed to be "fair"—that is, all the information needed to solve them is typically given from the beginning. The pupil does not find out anything as he goes along that might have been otherwise. I will call problems of this kind "puzzles," because they are so different from the problems of ordinary human life. To solve "puzzles" like this requires particular skills, often skills of a high order. It is appropriate to call them academic skills.[6]

Academic skills and puzzles are challenging but may be useless and constraining outside the school setting.

What is Meant by Assessment?

In general, *assessment* of transfer skills is the evaluation of the capacity of the learner to adapt to new work and life situations, not to solve "puzzles." The assessment of the abilities previously mentioned in the context of occupational adaptability is quite different than assessment within the context of other areas of education and psychology. For example, the purpose of the assessment of the level of a high school student's ability to reason by analogy is usually for college admissions. The assessment of a very young student's ability to reason by analogy is usually for the purpose of determining whether the child has an acceptable level of mental capacity for functioning in the normal public school setting. These are assessments related to academic skills. The assessment of the ability of the learner to transfer one or several skills from one occupational setting to another might have quite a different purpose. True, assessment, among other things, could inform the educator or employer about the presence or absence or level of mastery of various abilities that, for example, assist the process of transferring skills acquired by a homemaker in planning family meals to a job as hospital dietician. However, it is assumed that, rarely, if ever, would her "score" (if a norm-referenced score was possible) on any measure of transfer ability keep her from obtaining entry to that position. It is what she can do or the observed behavior which shows transfer has occurred that is essential.

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[6] Neisser, U. Academic and artificial intelligence. In L. B. Resnick (Ed.), *The nature of intelligence.* New York: John Wiley & Sons, 1976.

Assessment in the context of the transfer process should contain elements of learning and diagnosis. Assessment should not only be concerned with monitoring and evaluating a learner's transfer facility, but should actually promote this facility. Unlike the testing situation of the Kpelle's above, which leads to a "score" that serves to label an individual or group, assessment should be a primary aspect of the educational process itself and, in fact, should be integrated with such matters.

The following should be general characteristics of the assessment situation:

1. Multimodal in presentation and response (not just tests consisting of multiple-choice items)
2. Related to stated outcomes of training
3. Relevance or similarity to real-life situation
4. Practice and warm-up
5. Feedback that is prescriptive or diagnostic
6. Ongoing and continuous

Finally, assessment here should be clinical rather than statistical, individual rather than group. It should be as informative to the learner as it is to the teacher.

How Can Transfer Skills Be Assessed?

There are two types of educational measurement that can be applied to the assessment of transfer skills as defined above. *Traditional* assessment tools are objective, multiple-choice tests. These tests can be scored numerically and scores are usually referenced to a normative group. *Non-traditional* methods are usually those requiring open-ended responses, products, or performances. They are very often characterized by having a real-world flavor. These nonobjective responses are scored by expert judges who use guidelines and criteria for making such judgments. The information below is intended to give the reader an overall picture of the two methods including their capabilities and limitations.

Objective Tests. There are a number of published instruments that have been designed to measure the abilities listed previously. They are paper-and-pencil devices which contain, in the main, multiple-choice items. Their advantages are that they are economical and permit an efficient and objective assessment of various skills and abilities that might be needed for transfer. However, there are characteristics associated with multiple-choice tests that are at odds with the characteristics of the assessment situations suggested in the previous section. They tend to be artificial, resulting in a lack of face validity. Learners may not see the connection between the test and what is claimed to be measured. The tests are unimodal in presentation and response. A considerable amount of reading is required and therefore the level of skills that are being measured are confounded with the learner's level of verbal aptitude, when verbal skill may not be correlated with the skill being assessed. In using these tests, one runs the risk of testing for "school-based" or academic skills. However, these instruments are convenient and can be useful for practice or warm-up. The resulting scores can be informative when used in conjunction with more real-world, nontraditional assessment methods. Published test exist that measure one's cognitive ability, factor, or skill; others contain sections or subtests that measure cognitive abilities that may be associated with the transfer process. However, further investigation and analysis of the content of such tests is needed, in order to support the validity of the relationship between test outcomes and transfer skill acquisition.

Care must be taken in the selection and use of any tests, especially when assessing transfer ability. Such tests are to be used mainly for guidance, diagnosis, feedback, or evaluation rather than for placement or promotion. For example, a manual associated with a test of synthesizing ability may indicate that extensive studies have been done to show how well the test predicts academic performance (predictive validity). This should be noted, but other information may be more important for teaching for transfer. Does the test look as if it measures what it purports to measure? What is the reading level of the items? Is it self-scoring and does it provide feedback to the learner? Do the items relate to real-world behaviors?

Reliability of the test would be important for any situation in which it might be used. The reliability of the instrument indicates the amount of error present in any score or rating for an ability and basically shows the degree of consistency of measurement when using a particular procedure or test. Learners should be assured that even though the test is mainly to provide practice in transfer and guidance, it is fairly reliable across time and situations.

Practical and substantive questions to consider when evaluating and selecting a published test for use include:

1. What is the purpose and use of the test and how does it relate to the purpose of your training and assessment?
2. How and why was the test developed?
3. What sorts of data and norms have been collected in the course of test development?
4. Do the data specify age, sex, educational background, socioeconomic status, and geographic distribution of the subjects used for test development?
5. Are there any sex or cultural biases reflected in the test?
6. Is there any unethical practice associated with the test and is there truth-in-assessment?
7. How are scores reported and what information is available to assist in interpretation?
8. Is it easily available or is it so secure that it is difficult to purchase?
9. What type of training is necessary to administer the test?
10. How long does the test take?
11. What are all the costs associated with the test?
12. What are the scoring options associated with the test? Self-scoring? Scored by the test publisher?

Nontraditional Methods. Objective tests are the most practical and efficient, and thus most traditional, method for assessing cognitive skills associated with skill transfer. If, however, transfer skill assessment is to have educative benefit and contain elements of realism that are essential to face validity, other less frequently used—thus nontraditional—assessment procedures may be indicated. These procedures have the added advantage of usually providing more immediate and personalized feedback to the learner. Unlike multiple-choice, objective examinations, these procedures use expert judgment rather than scoring that is based on norms and statistical studies. Experts usually rate the learner on cognitive behaviors or dimensions that show successful transfer using a variety of materials. Then one or several persons must decide, through consensus, on the extent and level of learning. It

should be noted that several measurement techniques can be used to assess whether transfer has occurred. This is especially true when a great deal of error is associated with each technique or when the measurement procedures are far removed from direct observation of student performance. Some measurement techniques which have been developed in the fields of psychology, business, industry, and the military will be described briefly. Appendix A is an annotated bibliography of a selection of documents that explain some specific assessment methods more fully.

Interviews and Oral Examinations. The assessment interview is a face-to-face interpersonal situation in which the interviewer asks the candidate questions designed to obtain answers which will lead to an evaluation of transferability. During the interview, skills, knowledge, or concepts attained through experience can be listed, described, and later evaluated; and a simulated problem or situation may be presented to determine whether transfer has occurred. The interview can be used to "talk out" solutions to problems.

In general, questions in the interview should be:

1. directly related to the skills and knowledge the assessor wishes to assess,
2. appropriate in type for the kinds of information to be obtained,
3. clear and unambiguous,
4. free of leading questions,
5. requesting only that knowledge or information that the learner is expected to have,
6. free of questions that require personal information that the interviewee may resist revealing,
7. constructed so that the interviewee does not offer the socially acceptable response.

The interview as a measurement technique is adaptable to individual situations and, in most cases, allows for probing in order to obtain more information. The major disadvantage of the interview is that it takes much more time and tends to be less valid and reliable than more objective techniques.

In the standardized or *structured interview,* the questions, their sequence, and the wording are fixed. The interviewer can take very little liberty in changing the interview format. The highly structured interview can be administered by tape, in person, or in a written form. However, the responses to such an instrument are oral. The *unstructured interview* is much more flexible and open. Topics, issues, and questions are outlined, but the content of the questions, their sequence, and the wording are entirely up to the interviewer. In reality, the assessment interview is a combination of both techniques.

An effective assessment use of a semi-structured interview would be to present orally to a learner possessing a set of transferable skills a problem and situation quite different from that in which these skills were learned or last practiced. After presentation and discussion, the learner would be asked questions about application of these skills to the new setting.

Simulations. In simulations, sometimes called situational tests, the learner is asked to pretend that he or she is engaged in some realistic task, the nature and content of which are described in some detail before his or her role is assumed. Often the simulation is less complex and more convenient than the real situation and operates under a compressed time schedule. Such a procedure

offers the assessor and learner the unique opportunity to observe and measure the quality of performance in a life-like setting that often cannot be measured by other means. It also offers the learner an opportunity to practice transfer skills or be trained in transfer. Simulations are ordinarily used to assess complex qualities such as analytical thinking, goal setting, risk taking, interpersonal competence, decision making, sensitivity to the behavior of others, oral communication, and planning skills, many of which influence the transfer process. However, a major limitation is the more faithful, comprehensive, and thus valid, the exercise, the more costly the procedure.

For situational tests or simulations to be of maximum assessment and educational value, the following rules should be observed:

1. Specific behaviors relevant to the variables being measured should be identified before the setting and problem situations are developed.
2. Problem situations should be carefully structured to provide the opportunity for candidates to act in a satisfactory or unsatisfactory manner with respect to the specific behaviors.
3. The amount of fidelity to reality for each aspect of the simulation must be determined and weighed against the limits of available resources.
4. Instructions must be sufficiently clear so that the candidate knows what is expected.
5. Tasks included in the exercise should not require knowledge that the candidate is not ordinarily expected to have.
6. Standard rating instructions and multiple judgments are needed to achieve validity.
7. The designer of an exercise must have a thorough knowledge of the experience being simulated.

Simulation technology has generated a number of specific assessment devices which can also be used for training, some of which will be described below.

Educational games as simulation exercises can be categorized as (1) media-ascendant simulation games which are mediated by machines; (2) interpersonal ascendant simulation games, in which decision making, role playing, and player interaction are emphasized; and (3) nonsimulation games, which merely provide a competitive context for learning and practicing concepts and principles. Academic games are used in the assessment of problem-solving and decision-making skills.

Academic or management games could be one of the most economical assessment techniques in that virtually hundreds of them are available through companies that specialize in manufacturing educational products. Since the scoring and rating behavior during an educational game is usually complex and therefore subject to error, the games shouldn't be used as the sole measurement of problem-solving or decision-making ability.

Some caution should be exercised when using games for assessment purposes. Little research or discussion has been focused on measurement problems concerning the use of games for assessment purposes. Several factors inherent in the technique might have a tendency to confound outcomes and thus interfere with effective assessment. For example, performance in gaming can be influenced by variables such as tolerance for ambiguity and risk-taking. These in turn are moderated by sex, minority group membership, and socioeconomic class, some of the same factors that influence

the transfer process. If these variables influence problem-solving behavior and decision making in the world of work, the use of games to measure these skills is justified. However, if factors such as risk taking only influence behavior in the gaming situation, this sample of the candidate's behavior would not be an accurate representation. Also some individuals who participate in a game as an assessment technique may resent being judged by winning or losing. Despite these problems, games could be powerful training devices.

When the number of learners is large, the expense of simulation is too great, and/or the assessor is interested in obtaining data from the candidate on specific crucial information and skills required to solve a problem or diagnose a malfunction (human or machine), the *written simulation* is appropriate. It is a paper-and-pencil situation which may follow any number of written formats, even multiple-choice or essay.

The *case study* simulation involves a fairly complete and realistic statement of some problem that can be related to business, human services, or almost any area of human experience. The candidate is asked to write an analysis of the problem in a specified period of time, and his/her report should contain alternative solutions and recommendations for action. The exercise is used to assess the candidate's ability to analyze and solve complex problems. Sometimes the case under consideration is not written. It can be presented to the candidate in several modes, such as filmstrip, audiotape, or videotape.

The *in-basket exercise* takes its name simply from the in-basket or tray found in most businesses and institutions where employees work from an office or desk. Forms of this exercise are being used to assess police officers, military officers, and school principals. The exercise simulates a specific organizational role, requires the examinee to deal with problems as if he/she were actually on the job, and provides a set of materials which may contain incoming letters, memos, reports, papers to be signed, and telephone messages.

All student decisions and actions are recorded in writing and may include letters, memos, outlines, directions, and the content of phone calls. These written products are usually scored by trained evaluators using methods similar to those used for essay grading. More efficient scoring techniques have been devised wherein a checklist is provided to the candidate, and he/she picks out the actions performed from a wide list of possible actions. The learner may also add any unusual or unlisted actions taken. These responses are judged and scored by trained assessors or the learner. At times, an interview after the exercise is used in lieu of scoring procedures.

Essays. Essay examinations are instruments which are characterized by the presentation of questions or tasks to which the student responds by organizing and writing an answer. Some tests are based on the student giving written responses to situations presented on audio- or videotape. Usually, no single response or pattern of responses can be listed as correct in that even an expert cannot usually classify a response as categorically right or wrong. Rather, there are different degrees of quality or merit which can be recognized. Essay content may be factual or creative.

The following steps should be considered in constructing essay assessment instruments:

1. Define objectives clearly so that tasks may be constructed which are related to the framework of objectives.
2. Formulate well-focused questions and define the task through determining the amount of freedom of response.

3. Construct several model answers while taking note of writing time.
4. As a pretest check, have an examiner who didn't formulate the questions answer them.
5. Ask colleagues or specialists to review the questions.
6. Pretest the items so that the following can be answered:
   a. Do students appear to understand the intent of the question, or do they appear to interpret it in ways not intended?
   b. Is the question of appropriate difficulty for the examinee population?
   c. Is it possible to grade answers reliably?
7. Recognize the importance of an adequate sample of questions (a sufficient number, the right number of short and long questions, and alternate questions from which to choose).

The main source of measurement error when essays are used for assessment is associated with the rating of essays. Essay rater research has shown that:

1. Different raters tend to assign different judgments to the same paper.
2. A single rater tends to assign different judgments to the same paper on different occasions.
3. The differences tend to increase as the essay question permits greater freedom of response.

These findings are probably directly related to the values inherent in the educational situation as well as the values of the raters. If essays are "academically loaded," then they would not differ in nature from most multiple-choice examinations. If the essay questions do not merely test academic skills, they could be used in assessment situations which include demonstrating the following transfer skills: information access and production, short- and long-term planning, value analysis, synthesis, and critical thinking.

Performance tests. There is a stronger element of realism in performance tests than in simulations because they resemble the situation in which a specific kind of experiential learning is applied more closely. Frequently, a performance test is nothing but a *work-sample* which requires the accomplishment of specific tasks in a controlled setting. Or it may consist of a situational observation of performance in a natural setting. These procedures are not as flexible as simulations since they don't always allow for changes in setting or context. In assessing transfer skills, it is suggested that the setting or situational variables be changed.

A work sample attempts to reproduce all or an important part of the actual operations and tasks of the job, frequently utilizing the actual equipment used on the job. Sometimes the test involves certain difficulties typical of the job which the examinee must overcome. Some of the realism of the work setting may be sacrificed, but the critical job elements are present and the test is readily recognized as a realistic representation of the tasks one would encounter on the job.

Interviews are suggested to follow up the performance test. In this way, the teacher or assessor can determine whether the learner is mimicking behavior or really understands how his or her transferable skills are being transferred.

Self-assessment. Self-assessment or self-evaluation can be regarded in general as a set of relatively undefined techniques by which the student judges his/her own level of accomplishment. Since the student is likely to be knowledgeable about past accomplishments, it is reasonable to assume that with appropriate guidance and criteria he/she can provide accurate indication of his/her present abilities. Self-evaluation provides the feedback to the learner that is so necessary for acquiring educative benefits from assessment. It has been shown that the transfer process is more rapid if the learner can discover relationships for him- or herself.

Self-assessment can be an integral part of all the measurement techniques described above. Students, with the help of explicit criteria and rating forms, can rate themselves on their performance in such measurement situations as simulation exercises, performance tests, or essay examinations. The learner's ratings and judgment will reflect his/her perceptions about the extent and level of specific learning transfer.

The ratings can be compared to the ratings of assessors resulting in an evaluation conference with the student's teacher, assessor, and/or counselor. Discrepancies can be resolved; areas of strength and weakness can be pointed out. Also, it may be that the learner will be asked to do some supplementary or practice work in areas where this extra effort will boost the level of transfer. In addition to self-rating, self-assessment could include procedures in which the learner "talks out" solutions to the problems presented during assessment so that the learner can learn more about his or her problem-solving ability and style.

Although the informal methods of self-assessment (for example, periodic discussions between a student and teacher) have the appeal of flexibility and individuality, their subjective nature and lack of uniformity make them difficult to evaluate and address without training and practice. In addition to its assessment function, realistic self-appraisal is useful both for the identification and improvement of weak transfer skills and for motivating transfer of learning. To a large degree, the accuracy and the utility of the self-assessment process will depend on the effort that student and teacher expend on it and the amount of guidance or training that the student receives in the process.

Conclusion

The techniques described in the previous section cannot be prescriptions for measuring the extent and level of transfer skills at this stage in the investigation of the transfer process. It would be naive and premature to think any specific tests or procedures could be recommended. The array described in this paper is meant to show learners, teachers, and program evaluators that there are aids available to them. These tools can help them determine whether transfer has occurred and serve them in the educational process. At present, there is no manual or set of procedures that will inform these individuals as to how these tools can be melded with transfer process. Such operations are left to those creative minds in research and education that are challenged by the notion of testing and teaching for transfer through assessment.

Appendix A

Bibliography of Selected Documents Describing Nontraditional Assessment Methods

Interviews and Oral Examinations

How to Interview by W. Bingham and B. Moore. New York: Harper, 1959.

A simply written guide to constructing and performing the interview, this book contains an entire chapter on oral examinations.

"How Reliable are Good Oral Examinations?" by H. D. Carter. *California Journal of Education,* 1972, *13,* 147-153.

To ascertain the reliability of the oral exam, the author analyzed data from a sample of 250 candidates examined in a field of medical specialization. The results indicate that the oral exam is highly reliable and that there is a low relationship between the oral exam and a written exam covering the same subject area.

The Selection Process: Choosing the Right Man for the Job by M. M. Mandell. New York: The American Management Association, Inc., 1964.

Although this book emphasizes techniques concerning the hiring of individuals in eight different occupational groups, Chapters 12, 13, and 14 are particularly informative on the subject of interviewing, and much of the material can be interpreted in the light of assessment rather than selection. The chapters contain descriptions of the stress interview and the group oral examination.

"On Maximizing the Information Obtained from Science Examinations—Written and Oral" by J. E. Platt. *American Journal of Physics,* 1961, *29,* 111-122.

The author regards the written examination as a mapping function in which the student's abilities are mapped on a numerical scale. An oral exam is described as a search path to locate the boundaries of a student's knowledge. Common pitfalls of the oral exam are described.

Simulations

Serious Games by C. C. Abt. New York: The Viking Press, 1970.

This book explores the ways in which games can be used to instruct and inform. Chapters examine topics such as evaluating the cost-effectiveness of games and improving education with them. The use of games in general areas such as the physical and social sciences, vocational guidance, and government and industrial planning is discussed.

A Primer on Simulation and Gaming by R. B. Barton. Englewood Cliffs, N.J.: Prentice-Hall, 1970.

This book combines computer and noncomputer approaches to simulations and gaming but does not require learning a computer language. A checklist for conducting man-only and man-computer simulations is of practical value.

"Issues in the Development and Validation of In-Basket Exercises for Specific Objectives" by L. A. Crooks. *Research Memorandum* (RM-68-23), Princeton, N.J.: Educational Testing Service, 1968.

This paper discusses the practical issues surrounding the development and use of the in-basket test.

"Why Do We Use Situational Performance Tests?" by D. W. Fiske. *Personnel Psychology*, 1954, *7*, 464-469.

The article discusses sources of error in measurement when using situational tests.

"Some Considerations in the Development of Situational Tests" by J. C. Flanagan. *Personnel Psychology*, 1954, *7*, 461-464.

The author explains the advantages and disadvantages of using situational tests to measure attitude, motivation, and other personality factors.

"Factors in In-Basket Performance" by N. Frederiksen. *Psychological Monographs*, 1962, *76*, (Whole No. 541).

A factor analysis of the 70 aspects of behavior used to rate 335 people on an in-basket test revealed 8 primary factors, including informality, directing subordinates, discussing, and acting in compliance with suggestions.

"Do Filmed Cases Improve the Case Method?" by T. B. Green. *Training and Development Journal*, 1973, *27*, 28-31.

The article summarizes a study in which the case method was combined with a film approach.

"A Management Tool: The In-Basket Exercise" by F. M. Lopez. *Simulation and Gaming News*, 1973, *1*, 1 and 19.

The article describes the Quasar In-Basket Exercise which can be adapted for use in almost any organization. It includes a method of scoring via the Action Report, either by mechanical or electronic means.

"Simulation Technique in the Measurement of Problem-Solving Skills" by C. H. McGuire and D. Babbot. *Journal of Educational Measurement*, 1967, *4*, 1-9.

This article describes the development of a series of branched problems in patient management that require sequential analysis and decision. The problems were designed to measure aspects of behavior defined by a criterion group as essential components of clinical competence.

"The Name of the Game is Simulation" by S. B. Parry. *Training and Development Journal*, 1971, *25*, 28-32.

The writer explains the rationale for using games and simulations, with some examples, and makes the interesting distinction between simulations designed as application of prior learning and those intended to give the learner an opportunity to gain insight into his own behavior.

"Critical Incidents in Counseling: Simulated Video Experiences for Training Counselors" by J. D. Spivack. *Counselor Education and Supervision,* 1973, *12,* 263-270.

This article explains the rationale, development, and use of a simulation approach to training counselors in which videotaped vignettes of critical incidents that occur in the course of establishing and maintaining a helping relationship are presented to trainees as stimuli.

"Sources in Simulation and Academic Gaming: An Annotated Bibliography" by P. J. Tansey and D. Unwin. *British Journal of Educational Studies,* 1969, *17,* 193-208.

This bibliography attempts to reduce more than 2,000 articles on simulation to 87 citations. The articles selected concentrate in the fields of school and college learning with particular emphasis on simulation as a teacher training tool. Some articles on role playing and sociodrama are included.

"Assessing Clinical Judgment" by J. W. Williamson. *Journal of Medical Education,* 1965, *40,* 180-187.

The author describes methods of analysis for data generated from branched problems in patient management.

Essays

"Essay Examinations" by W. E. Coffman. In *Educational Measurement,* R. L. Thorndike, Ed. Washington, D.C.: American Council on Education, 1971, 271-302.

This chapter gives a systematic analysis of essay examinations and describes their construction, limitations, scoring procedures, technical problems, and needed research in the area.

Measuring Educational Achievement by R. L. Ebel. Englewood Cliffs, N.J.: Prentice-Hall, 1965, 84-123.

Chapter 4, "The Characteristics and Uses of Essay Tests," is of value to the classroom teacher. Special consideration is given to guidelines for constructing teacher-made essay tests.

"Schools of Thought in Judging Excellence of English Themes" by J. W. French. In *Proceedings, Invitational Conference on Testing Problems, 1961.* Princeton, N.J.: Educational Testing Service, 1962, 19-28.

This paper investigates the reasons why essay graders disagree and what information the essay response, when properly graded, can offer that the multiple-choice response cannot.

Performance Tests

Handbook on Performance Testing, A Practical Guide for Test Makers by J. L. Boyd and B. Shimberg. Princeton, N.J.: Educational Testing Service, 1970.

This book describes how to plan, develop, and grade work sample tests, and the types of documents needed for their administration. It provides a portfolio of tests, such as those for machinist, cosmetologist, dental hygienist, and bench woodworker.

"Performance and Product Evaluation" by R. Fitzpatrick and E. J. Morrison. In *Educational Measurement* (2nd ed.), R. L. Thorndike, Ed. Washington, D.C.: American Council on Education, 1971, 237-270.

This chapter describes work sample tests and distinguishes them from other kinds of simulated testing situations.

REPORTS ON OCCUPATIONALLY TRANSFERABLE SKILLS

McKinlay, B. *Characteristics of jobs that are considered common: Review of literature and research* (Info. Series No. 102), 1976. ($3.80)

A review of various approaches for classifying or clustering jobs, and their use in (a) describing the elements of commonality involved when people make career changes, and (b) understanding better the concepts of occupational adaptability and skill transfer.

Altman, J.W. *Transferability of vocational skills: Review of literature and research* (Info. Series No. 103), 1976. ($3.80)

A review of what is known about the transferability of occupational skills, describing the process or the facilitators of skill transfer.

Sjogren, D. *Occupationally transferable skills and characteristics: Review of literature and research* (Info. Series No. 105), 1977. ($2.80)

A review of what is known about the range of occupation-related skills and characteristics that could be considered transferable from one occupation to another, describing those transferable skills which are teachable in secondary and postsecondary career preparation programs.

Ashley, W.L. *Occupational information resources: A catalog of data bases and classification schemes* (Info. Series No. 104), 1977. ($18.20)

A quick and concise reference to the content of 55 existing occupational data bases and 24 job classification schemes. Abstracts of each data base and classification scheme include such information as: identification, investigator, location, documentation, access, design information, subject variables, occupation variables, and organization variables.

Wiant, A.A. *Transferable skills: The employer's viewpoint* (Info. Series No. 126), 1977. ($3.25)

A report of the views expressed in nine meetings across the country by groups of local community and business representatives concerning the types of transferable skills required and useful in their work settings and how a better understanding of transferable skills could improve training and occupational adaptability.

Miguel, R.J. *Developing skills for occupational transferability: Insights gained from selected programs* (Info. Series No. 125), 1977. ($3.80)

A report of clues and suggestions gained in the review of 14 existing training programs, with recommendations for practice which appear to have been successful in recognizing skill transfer and taking advantage of an individual's prior skills and experience.

Ashley, W.L., & Ammerman, H.L. *Identifying transferable skills: A task classification approach* (R&D Series No. 146), 1977.

A report of an exploratory study designed to test the usefulness of three classification schemes in identifying the transferable characteristics of tasks in diverse occupations.

Pratzner, F.C. *Occupational adaptability and transferable skills* (Info. Series No. 129), 1977. ($6.25)

A summary final report, presenting and discussing an array of issues encountered in the various project activities, and offering recommendations.

Selz, N.A., & Ashley, W.L. *Teaching for transfer: A perspective for practitioners* (Info. Series No. 141), 1978. ($2.35)

An informal discussion of the need for teachers and trainers to give more attention to developing transferability and transferable skills in students for learning and life performance applications. Practical suggestions and techniques for improving the capacity of students to transfer learned skills and knowledge to new situations are given.

Brickell, H.M., & Paul, R.H. *Minimum competencies and transferable skills: What can be learned from the two movements* (Info. Series No. 142), 1978. ($5.10)

A report comparing and contrasting potential impact of the transferable skills and minimum competency testing movements on school programs, staff, and students. Key questions and alternative strategies are presented to assist educational planners and administrators in formulating policy and establishing promotion or completion criteria in secondary and postsecondary education.

THE FOLLOWING REPORTS WILL BE AVAILABLE IN 1980:

Ashley, W.L., Laitman-Ashley, N.M., and Faddis, C.R. (Eds.) *Occupational adaptability: Perspectives on tomorrow's careers* (Info. Series No. 189), 1979.

Proceedings from a national symposium. The topics focused on how training for adaptability can increase the use of human resources in the labor force.

Selz, N. (Ed.) *Adult learning: Implications for research and policy in the eighties,* 1979.

Proceedings from a national symposium on adult learning. Topics include state of the art, research into practice, policy implementation, and future directions.

Wiant, A.A. *Self-assessment for career change: Does it really work? Summary report of a follow-up study* (Info. Series No. 191), 1979.

An analysis of the impact of self-assessment on one's subsequent employment experience. The particular assessment technique studied is one intended to help identify those skill attributes which have provided satisfaction in various life experiences. Outcome measures included skill utilization and job satisfaction.

Selz, N.A., and Jones, J.S. *Functional competencies in occupational adaptability and consumer economics,* 1979.

Perceptions of national adult samples are reported. Document includes where competencies should be taught —at home, at school, on-the-job, self-taught—and how important these competencies are in successful work and life activities.

Kirby, P. *Cognitive style, learning style, and transfer skill acquisition,* 1979.

A review and synthesis of the literature in adult learning styles, as they relate to the acquisition of transfer skills.

Knapp, J.E. *Assessing transfer skills,* 1979.

A review of traditional and non-traditional assessment with respect to the assessment of transfer skills.

Sommers, D. *Empirical evidence on occupational mobility* (Info. Series No. 193), 1979.

A review and synthesis of the literature on the characteristics of occupationally mobile workers and their jobs.

Laitman-Ashley, N.M. (Ed.) *Women and work: Paths to power* (Info. Series No. 190), 1979.

Proceedings from a national symposium that offer perspectives on women in the work force. Topics will cover five major transition points that any person can experience in a lifetime.

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